

REMARKS

In response to the above Office Action, claims 1 and 2 have been amended to include the diameter of a single fiber of the yarns as set forth in claim 4 and claim 4 has been cancelled. Claims 1 and 2 have also been amended for clarity. Finally, claim 5 has been amended to avoid improper multiple dependency and to place the claim in a more acceptable format. Essentially, claim 5 is claiming a printed wiring board wherein a substrate of the board is made from the glass cloth of claim 1 or 2.

In the Office Action, the Examiner rejected claims 1-3 under 35 U.S.C. § 102(b) for being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) for being obvious over U.S. Patent No. 5,217,796 to Kasai et al. (hereafter Kasai). Claims 1-3 were also rejected for being anticipated by, or in the alternative, for being obvious over JP 11-061596 (hereafter JP'596).

In the present invention, a diameter of a single-fiber of the glass yarn used for the glass cloth is as small as diameter D or less as defined by JIS-R-3413 for the following purposes, as disclosed on page 8, lines 29 to 35 of the specification:

- (1) The single-fibers can be dispersed uniformly in the glass cloth;
- (2) The boring resistance is reduced when a printed wiring board is bored by a drill; and
- (3) The removal of glass becomes easier when a laser beam is used.

A single-fiber having a nominal diameter of D or less as defined by JIS-R-3413 is one having a diameter of 5 μm or less. Enclosed as **Exhibit A** is a copy of JIS-R-3413 with English translation showing that a diameter D of a glass fiber is 5 μm or less.

To provide excellent processibility when a laser beam is used, it is necessary for the entire surface of the glass cloth to be completely covered with flattened warp and

weft yarns, so that the distribution of glass fibers in the glass cloth becomes uniform, as disclosed on page 7, lines 27 to 30 of the specification.

For this purpose, the equation (1-a) in claim 1 and the equation (1-b) in claim 2 are defined as follows:

$$C \times A / (25 \times L \times N) \geq 1.0 \text{ --- (1-a)}$$

$$C \times A / (25 \times L \times N) \geq 0.75 \text{ --- (1-b)}$$

Kasai discloses a diameter of a single-fiber of 5 to 9 μm (see column 3, line 5). However, only glass yarns of type ECG75 and ECE225 (see Table 2 of Example 1) which have single fiber diameters of 9 μm and 7 μm , respectively, are used in the Examples.

JP 11-061596 does not directly disclose a diameter of a single-fiber, however, a glass yarn of type ECG75 is mentioned in Examples 1 and 2, and of type ECE225 is mentioned in Examples 3 and 4. Accordingly, JP'596 also only discloses a diameter of a single-fiber of 7 and 9 μm ; i.e., only diameters E and G.

As is clear from this, it is an object of the prior art to use thicker cloth. See, for example, paragraph [0006] of the English translation of JP'596, line 4. "Cross" should be "cloth" in the translation. In other words, an object of the prior art is to provide a laminated board excellent in surface flatness by using a glass cloth as thick as possible in order to improve processibility during the lamination process while reducing costs.

On the other hand, the diameter of a single-fiber used in the glass cloth of the present invention is smaller than that used in the cited references and the problems to be solved are different.

As explained above, to provide excellent processibility, a glass cloth must satisfy the equation (1-a) in claim 1 or the equation (1-b) in claim 2. That is, as a constituent feature, the equation (1-a) is necessary when one of the groups of the warp and weft yarns is arranged with substantially no gap between the yarns, and the equation (1-b) is necessary when both of the groups of the warp and weft yarns are arranged with substantially no gap between the yarns.

Kasai and JP'596 disclose a glass cloth made of glass yarns of diameters E and G. Moreover, there is no disclosure or suggestion in Kasai and JP'596 of a glass cloth that satisfies the equation (1-a) or (1-b) in order to provide excellent processibility when using a laser beam.

Table 1, attached as **Exhibit B**, according to applicants, shows Examples of JP'596. It is clear from Table 1 that the glass cloth disclosed in JP'596 cannot satisfy the equation (1-a) or (1-b). As Kasai uses approximately the same glass cloth as JP'596, the same conclusion as JP'596 can be reached.

Experimental Evidence, attached as **Exhibit C**, shows the results of an experiment regarding JP'596. This evidence will be submitted in a Rule 132 Declaration which will be filed soon. It is clear from this Experimental Evidence that excellent processibility such as that of the present invention cannot be obtained, when glass yarn having a single-fiber diameter of 7 or 9 μm as disclosed in JP'596 and Kasai is used.

In the present invention, the following items (i) and (ii) are important.

(i) The glass cloth has groups of warp and weft yarns and at least one of the groups is arranged with substantially no gap between the yarns.

(ii) To obtain the glass cloth as mentioned above without increasing the amount of glass in the insulation substrate, the yarns are sufficiently flattened to a specific width (A) of a cross section of the yarns, satisfying the equations (1-a) or (1-b), as disclosed on page 6, lines 30 to 34 of the present specification.

When a yarn relatively large in single-fiber diameter (L) and in number (N) of single-fibers such as that disclosed in Kasai and JP'596 is used, and then the yarn is opened, the resultant glass cloth can only satisfy the above item (i). However, processibility of the glass cloth deteriorates (see Experimental Evidence), because the glass cloth has a construction of an accumulation of single fibers having relatively large diameter in the direction of thickness. As a result, the glass cloth cannot satisfy the above item (ii).

Kasai discloses using a glass fiber comprising several hundred monofilaments each 5 to 9 μ in diameter (see column 1, lines 26 to 28). However, there is no disclosure or suggestion in Kasai concerning the necessity that a substantial flattening ratio is high.

The feature of the present invention is a specific glass cloth using a glass yarn which has a specific diameter of a single-fiber, and having a specific weaving construction with flatness that satisfies the equations (1-a) or (1-b).

Therefore, it is submitted that a glass cloth according to the present invention as defined by claims 1 and 2 is not obvious to a person of ordinary skill in the art from the disclosures of Kasai or JP'596.

Since claims 3 and 5 depend from claim 1 or 2, it is submitted these claims are patentable over the cited references for the same reasons claims 1 and 2 are patentable.

It is believed claims 1-3 and 5 are in condition for allowance.

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our Deposit Account No. 06-0916.

Respectfully submitted,

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Attachments:

Exhibit A is a copy of JIS-R-3413

Exhibit B is Table 1

Exhibit C is Experimental Evidence